Claims

1. A method for suppressing interference in a radio communications receiver, the method comprising:

computing at least one transform of a received analog-to-digital converted radio signal;

computing metrics defining a concentration of an interference present for a transformed radio signal and a non-transformed radio signal;

selecting for use a transform having metrics indicating a highest concentration of an interference in a transfer domain, or selecting no transform if the metrics indicating the highest concentration of the interference is for the non-transformed signal;

suppressing a localized interference from the transformed radio signal by using weighting and computing an inverse transform of the transformed radio signal if the transform was selected, or suppressing the localized interference from the non-transformed radio signal by using weighting if no transform was selected; and

detecting and decoding an interference suppressed radio signal.

2. The method of claim 1, wherein the step of computing comprises computing the metrics comprising Coding Gain.

3. The method of claim 2, wherein the step of computing comprises computing the Coding Gain with the equation $CG = \dfrac{\frac{1}{N}\sum_{n=1}^{N}|r(n)|^2}{\sqrt[N]{\prod_{n=1}^{N}|r(n)|^2}}$,

wherein N is the length of the block, and r(n) is the received radio signal sample.

4. The method of claim 2, wherein the step of computing comprises examining the Coding Gain as relative magnitudes between different transforms, including a non-transform, and therefore computed with the equation $CG' = \dfrac{1}{\sqrt[N]{\prod_{n=1}^{N}|r(n)|^2}}$,

wherein N is the length of the block, and

r(n) is the received radio signal sample.

5. The method of claim 1, wherein the step of computing comprises calculating the metrics with a Consecutive Mean Excision Algorithm.

6. The method of claim 5, further comprising:

determining, with the Consecutive Mean Excision Algorithm, a background noise level of the received analog-to-digital converted radio signal; and

localizing as interference parts of the analog-to-digital converted radio signal exceeding the background noise level.

7. The method of claim 1, wherein step of selecting comprises selecting the transform comprising one of a Fast Fourier Transform, a Fractional Fourier Transform, a Discrete Cosine Transform, a Karhunen-Loeve Transform, a wavelet transform, or another transform having an inverse transform and metrics defining a concentration of the interference present in the transformed radio signal.

8. The method of claim 1, wherein step of selecting comprises selecting a first transform comprising a Fast Fourier Transform, and selecting a second transform comprising a Fractional Fourier Transform.

9. The method of claim 8, further comprising:

performing on a Fast Fourier Transform-transformed signal a Consecutive Mean Excision Algorithm in order to localize the interference and determine a bandwidth of the interference; and

selecting an order of the Fractional Fourier Transform based on the bandwidth of the interference.

10. The method of claim 9, further comprising:

performing a suppression of the localized interference from the transformed radio signal by using results of the Consecutive Mean Excision Algorithm if the Fast Fourier Transform was selected as the transform.

11. The method of claim 1, wherein step of suppressing comprises suppressing the localized interference with a Consecutive Mean Excision Algorithm.

12. An arrangement for interference suppression in a radio communications receiver, the arrangement comprising:

a transformer configured to compute a transform of a received analog-to-digital converted radio signal;

an interference estimator configured to compute metrics defining a concentration of an interference present for a transformed radio signal and a non-transformed radio signal;

a selector coupled to the interference estimator configured to select for use a transform having metrics indicating a highest concentration of an interference in a transfer domain, or to select no transform if the metrics indicating the highest concentration of the interference is for the non-transformed signal;

an interference suppressor coupled to the selector configured to suppress a localized interference from the transformed radio signal by using weighting if the transform was selected, or to suppress the localized interference from the non-transformed radio signal by using weighting if no transform was selected; and

an inverse transformer coupled to the interference suppressor configured to compute an inverse transform of the transformed radio signal if the transform was selected.

13. The arrangement of claim 12, wherein the interference estimator is further configured to estimate the metrics as Coding Gain.

14. The arrangement of claim 13, wherein the interference estimator is further configured to compute the Coding Gain with the equation

$$CG = \frac{\frac{1}{N}\sum_{n=1}^{N}|r(n)|^2}{N\sqrt{\prod_{n=1}^{N}|r(n)|^2}},$$

wherein N is the length of the block, and
r(n) is the received radio signal sample.

15. The arrangement of claim 13, wherein the selector is further configured to examine the Coding Gain as relative magnitudes between different transforms, including a non-transform, and the interference estimator is further configured to compute the Coding Gain with the equation

$$CG' = \frac{1}{N\sqrt{\prod_{n=1}^{N} |r(n)|^2}},$$

wherein N is the length of the block, and r(n) is the received radio signal sample.

16. The arrangement of claim 12, wherein the interference estimator is further configured to calculate the metrics with a Consecutive Mean Excision Algorithm.

17. The arrangement of claim 16, wherein the interference estimator is further configured to determine, with the Consecutive Mean Excision Algorithm, a background noise level of the received analog-to-digital converted radio signal, and to localize as interference parts of the analog-to-digital converted radio signal exceeding the background noise level.

18. The arrangement of claim 12, wherein the transformer is configured to use as the transform one of a Fast Fourier Transform, a Fractional Fourier Transform, a Discrete Cosine Transform, a Karhunen-Loeve Transform, a wavelet transform, or another transform having an inverse transform and metrics defining a concentration of the interference present in the transformed radio signal.

19. The arrangement of claim 12, wherein the arrangement comprises at least a first transformer and a second transformer, wherein the first transformer is configured to use a Fast Fourier Transform as the transform, and the second transformer is configured to use a Fractional Fourier Transform as the transform.

20. The arrangement of claim 19, further comprising:

a Consecutive Mean Excision Algorithm processor coupled to the first transformer configured to perform on a Fast Fourier Transform-transformed signal a Consecutive Mean Excision Algorithm in order to localize the interference;

a bandwidth determiner coupled to the Consecutive Mean Excision Algorithm processor configured to determine the bandwidth of the interference; and

an order determiner coupled to the bandwidth determiner and to the second transformer configured to determine an order of the Fractional Fourier Transform based on the bandwidth of the interference and to supply the order of the Fractional Fourier Transform to the second transformer.

21. The arrangement of claim 20, wherein the interference suppressor is configured to suppress the localized interference from the transformed radio signal by using results of the Consecutive Mean Excision Algorithm performed in the Consecutive Mean Excision Algorithm processor if the Fast Fourier Transform was selected as the transform.

22. The arrangement of claim 12, wherein the interference suppressor is configured to suppress the localized interference with a Consecutive Mean Excision Algorithm.

23. The arrangement of claim 12, wherein a radio communications receiver comprises a radio frequency processing part, and the arrangement is further configured to receive information on interference present in the received analog-to-digital converted radio signal from the radio frequency processing part and to utilize the received information in the interference estimator and the interference suppressor for localizing and suppressing the interference.

24. The arrangement of claim 12, wherein the arrangement is coupled to an input of a signal detector and an input of a decoder of a radio communications receiver.

25. A radio communications receiver comprising:

computing means for computing at least one transform of a received analog-to-digital converted radio signal;

computing means for computing metrics defining a concentration of an interference present for a transformed radio signal and a non-transformed radio signal;

selecting means for selecting for use a transform having metrics indicating a highest concentration of an interference in a transfer domain, or for selecting no transform if the metrics indicating the highest concentration of the interference is for the non-transformed signal;

suppressing means for suppressing a localized interference from the transformed radio signal by using weighting and for computing an inverse transform of the transformed radio signal if the transform was selected, or for suppressing the localized interference from the non-transformed radio signal by using weighting if no transform was selected; and

detecting means for detecting and decoding an interference suppressed radio signal.